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The International Bureau of WIPO
34, Chemin des Colombettes
1211, Geneva 20
Switzerland

Amendment of Claims under Article 19(1) (Rule 46)

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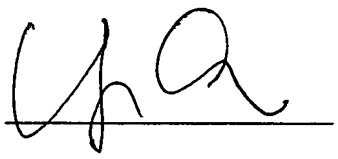
Applicant's or Agent's File reference: FREO0401PCT

Dear Sirs,

The Applicant who received the International Search Report relating to the above identified International Application transmitted on 28, September, 2004, hereby files the amendment of claims under Article 19(1) as indicated in the attached sheets.

We hereby would like to amend Claims 1, 3, 12, and 17 and also cancel the Claim 18. The Claims 2, 4 to 11, and 13 to 16 are retained unchanged. The attached sheets are replacement pages 21, 21/1, 22, 22/1 and 24.

Very truly yours,



Yuzo AGATA

Attachment :

(1) Amendment under Article 19(1) 5 sheets

請求の範囲

1．（補正後）　溶液中に浮遊する直径５０μｍ以下の微小気泡が前記微小気泡中に含まれる気体の自然溶解により徐々に縮小し、やがて消滅する過程において、前記微小気泡が縮小している段階で刺激を与えることにより縮小する速度を加速させ、前記微小気泡を消滅させることを特徴とする微小気泡の圧壊方法。

2．　前記微小気泡が縮小することにより、前記微小気泡が断熱圧縮的な変化を起し、超高圧で超高温な領域を前記微小気泡内部に形成する請求の範囲第１項に記載の微小気泡の圧壊方法。

3．（補正後）　前記微小気泡の気液界面において電荷密度の急激な上昇と前記気液界面からのフリーラジカル種の大量発生を伴う請求の範囲第１項に記載の微小気泡の圧壊方法。

4．　前記微小気泡を圧壊させることにより、前記微小気泡内部または前記微小気泡周囲に存在する物質の分解を行う活性酸素種等のフリーラジカル種の生成を伴う請求の範囲第１項に記載の微小気泡の圧壊方法。

5．　前記溶液中に溶解もしくは浮遊している化学物質の組成変化をもたらす請求の範囲第１項に記載の微小気泡の圧壊方法。

6．　前記溶液中に存在する細菌類、ウイルス類その他の微生物を死滅させる請求の範囲第１項に記載の微小気泡の圧壊方法。

7．　前記刺激とは、放電発生装置を用いて微小気泡含有溶液

が含まれている容器内で放電を行うことである請求の範囲第１項に記載の微小気泡の圧壊方法。

８．　前記刺激とは、超音波発信機によって微小気泡含有溶液が含まれている容器内へ超音波の照射を行うことである請求の範囲第１項に記載の微小気泡の圧壊方法。

９．　前記超音波発信機は、前記容器に接続された微小気泡発生装置の微小気泡含有溶液排出口と前記微小気泡発生装置の取水口との間に接続され、前記超音波発信機によって前記容器内へ連続的に超音波を照射することにより前記刺激を行う請求の範囲第８項に記載の微小気泡の圧壊方法。

１０．　前記刺激とは、微小気泡含有溶液が含まれている容器に循環系配管を形成した場合において、前記容器内の前記微小気泡含有溶液を循環ポンプにより前記微小気泡含有溶液の一部を循環させ、前記循環系配管内に備えつけられた単一若しくは多数の孔を持つオリフィスもしくは多孔板を通過させることで圧縮、膨張および渦流を生じさせることである請求の範囲第１項に記載の微小気泡の圧壊方法。

１１．　前記循環用ポンプは、押出し側に０．１ＭＰａ以上の陽圧を与える請求の範囲第１０項に記載の微小気泡の圧壊方法。

１２．（補正後）　前記循環用ポンプは、吸引側に環境圧より低い陰圧を与える請求の範囲第１０項に記載の微小気泡の圧壊

方法。

１７．（補正後）　前記刺激とは、前記微小気泡中に含まれるの前記気体がオゾンの場合、前記オゾンの分解に伴う気液界面でのラジカル連鎖反応を利用することである請求の範囲第１項に記載の微小気泡の圧壊方法。

１８．（削除）

What is claimed is: (Amendment claims)

1. (Amended) A method for collapsing microbubbles, characterized in that, in the step of the microbubbles having a diameter of 50 μm or less floated in a solution decreasing gradually by natural dissolution of the gas contained in the microbubbles and disappearing finally, the microbubbles are disappeared by accelerating the speed of the microbubble size decrease by applying a stimulation to the microbubbles.

2. The method according to Claim 1, wherein the microbubbles form an ultrahigh-pressure ultrahigh-temperature region inside in an adiabatic compression-like change of the microbubbles caused by decrease of the microbubbles size.

3. (Amended) The method according to Claim 1, wherein the electric charge density at the interface of the microbubbles increases rapidly and a great amount of free radical species are released from the gas-liquid interface.

4. The method according to Claim 1, wherein free radical species such as active oxygen species for decomposition of the substances present inside the microbubbles or in the area surrounding the microbubbles are generated by collapsing the microbubbles.

5. The method according to Claim 1, wherein the method gives rise to a compositional change of the chemical substances dissolved or floated in the solution.

6. The method according to Claim 1, wherein the method sterilizes microorganisms such as microbes, viruses, and others present in the solution.

7. The method according to Claim 1, wherein the stimulation is electric discharge in a container containing a microbubble-containing solution generated by using a discharger.

8. The method according to Claim 1, wherein the stimulation is ultrasonic wave irradiated into a container containing a microbubble-containing solution by an ultrasonicator.

9. The method according to Claim 8, wherein the ultrasonicator is connected to the container between a microbubble-containing solution outlet port of a microbubble generator connected to container and an intake of the microbubble generator and the stimulation is given by continuous irradiation of ultrasonic wave into the container by the ultrasonicator.

10. The method according to Claim 1, wherein, when a circulation pipe is connected to a container containing a

microbubble-containing solution, the stimulation is compression, expansion and swirling current generated by circulating part of the microbubble-containing solution in the container by the circulation pump and making the solution path through an orifice or porous plate having a single or multiple holes installed in the circulation pipe.

11. The method according to Claim 10, wherein the circulation pump gives a positive pressure of 0.1 MPa or more to the discharge side.

12. (Amended) The method according to Claim 10, wherein the circulation pump gives a negative pressure lower than the environmental pressure to the intake side.

13. The method according to Claim 1, wherein, when a circulation pipe is connected to the container containing a microbubble-containing solution, the stimulation is compression, expansion and swirling current generated by feeding the microbubble-containing solution in the container into the circulation pipe and making the solution path through an orifice or porous plate having a single or multiple holes installed in the circulation pipe.

14. The method according to Claim 1, wherein the stimulation is forcibly internal circulation, in the pipe for

feeding the microbubble-containing solution generated by a microbubble generator to a container, of making the microbubble-containing solution discharged from the microbubble generator pass through a punching plate installed in the pipe, taken in part of the microbubble-containing solution from an intake installed between the punching plate and the container and feeding it into a pump, feeding the microbubble-containing solution into the pump, discharging it form an outlet port installed between the microbubble generator and the punching plate, and making it pass through the punching plate once again.

15. The method according to Claim 14, wherein, the pump gives a positive pressure of 0.1 MPa or more to the discharge side.

16. The method according to Claim 14, wherein the pump gives a negative pressure lower than the environmental pressure in the upstream pipe.

17. (Amended) The method according to Claim 1, wherein, when the gas contained in the microbubbles is ozone, the stimulation is the radical chain reaction occurring at the -liquid interface associated with decomposition of the ozone.

18. (Canceled)